REMARKS

This paper is intended as a full and complete response to the Office Action dated April 5, 2006, having a shortened statutory period for response set to expire on July 5, 2006. A request for a one-month extension of time and the associated fee is included with this Response.

Claim 1 has been amended in the Application.

Claims 1-25 are pending in the Application.

I. Claim Rejections 35 USC § 102

The Office Action rejected Claims 1-25 under 35 USC § 102 (b) as being anticipated by *Cerutti et al* (US 5,512,235).

Applicant's Application is for a product, a thermally treated carbide material made by a specific process cooling, holding while cooled, heating, holding while being heated, then repeating the process. Applicant's process involves cooling the material to a first target temperature ranging from -120°F and -380°F, stopping and holding the material at the first target temperature for at least two hours, increasing the material to a second target temperature ranging from 0°F and 1400°F, stopping and holding the material at the second target temperature for at least twenty four hours, and repeating these steps at least two more times. (Applicant's Application Claim 1)

Cerutti et al refers to a method of high pressure and high temperature for creating a metal carbide supported polycrystalline compact in a high temperature and high pressure apparatus (*Cerutti et al* Claim 1). *Cerutti et al* involves a method including the steps:

placing a material in a chamber;

providing pressure to the material in the chamber; and

subjecting the pressured material to a high temperature and high pressure conditions. (*Cerutti et al*, Claim 1)

Cerutti et al does not teach a process of creating cryogenically, a treated carbide material.

Applicant claims a cryogenically treated carbide material by virtue of the cold temperatures described in the claims.

Applicant's material is cooled and held at the first target temperature, then heated and held at the second target temperature, then repeated at least two more times, consecutively, in order to obtain a material that is relieved of stresses at a microcrystalline level which is not done by Cerutti. *Cerutti et al* makes no mention of the use of cold or repeated heats to improve the performance of the metal.

Claims 2-25 depend upon independent Claim 1, and therefore include all of the limitations thereof. Since Applicant believes that independent Claim 1 is patentably distinct from *Cerutti et al*, Claims 2-25 are patentably distinct from *Cerutti et al* as well.

Reconsideration of the rejection to the Claims in view of the remarks is respectfully requested. Applicant believes that no new subject matter has been added.

The Office Action rejected Claims 1-3, 19, 23, and 7-17 under 35 USC § 103(a) as being unpatentable over *Hasegawa* (US 5,031,063).

Hasegawa teaches "a soft magnetic alloy film which principally consists of Co" (*Hasegawa* Column 2, lines 52-55) and applicant does not use the alloy. Hasegawa teach a single heat treat at temperatures between 520 C - 570 C, see Column 6, lines 60-63 and also column 7, lines 31-33, column 8, lines 15-18. No cold is used or suggested by the reference. Hasegawa does not fill the missing gaps of the Cerutti reference.

Applicant's Application is for a carbide material treated by cold and hot, repeatedly, made by a specific process, which is not suggested in *Hasegawa*.

Applicant's Application teaches forming a thermally treated carbide material by a

specific process that involves heating and cooling and then holding the material at those temperatures.

Applicant's process cools the material to a first target temperature ranging from -120°F and -380°F, stopping and holding the material at the first target temperature for at least two hours, increasing the material to a second target temperature ranging from 0°F and 1400°F, stopping and holding the material at the second target temperature for at least twenty four hours, and repeating these steps at least three times. (Applicant's Application Claim 1)

Applicant hereby submits an affidavit under 37 CFR 1.132 as evidence submitted to traverse the rejection. Affidavit 37 CFR 1.132 provides comparative test results demonstrating that steel sample #1 and sample #2 made by the *Hasegawa* or *Cerutti et al* process are significantly inferior to sample # 3 and sample #4 made by Applicant's process. See Attachment A.

Claims 2-3, 19, 23, and 7-17 depend upon independent Claim 1, and therefore include all of the limitations thereof. Since Applicant believes that independent Claim 1 is patentably distinct from *Hasegawa* (US 5,031,063), Claims 2-3, 19, 23, and 7-17 are patentably distinct from *Hasegawa* (US 5,031,063) as well. Reconsideration of the rejection to the Claims in view of the remarks is respectfully requested. Applicant believes that no new subject matter has been added.

Applicant appreciates the Examiner's time and attention to this matter. Applicant believes the Claims as now provided are in condition for allowance. Reconsideration of this application is respectfully requested. The Applicant invites the Examiner to contact the Applicant's representatives (713.403.7411) if any questions concerning this Application arise.

Respectfully submitted,

Date: 7-18-06

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Attachment A – Affidavit under 37 CFR 1.132

ATTACHMENT A – AFFIDAVIT UNDER 37 CFR 1.132

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Daniel Watson	**Group Art Unit: 1775**
Serial Number: 10/783,934	**Examiner: Miller, Daniel H**
Filed: 02/20/2004	**Confirmation Number: 7268**
For: Thermally Treated Carbide Material	**Attorney Docket Number: 1157.06**

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

AFFIDAVIT OF DANIEL WATSON

1. I, Daniel Watson, having an address at 350 Jennifer Lane, Driftwood, TX, am over the age of twenty-one years and am fully competent to make the following affidavit. I have personal knowledge of the statements made herein. I avow that these statements are true and correct.

2. I am the founder of Angel Swords located in Driftwood, Texas, a corporation that focuses on forging and selling high quality swords. I founded the company in 1979. We are the oldest and largest sword making company in the United States.

3. My education consists of a four year apprenticeship in traditional swordsmanship and traditional Japanese swordsmanship with Yoshindo Yoshihara. My swords have won at least 4 world championships for cutting tatami mats in excess of 14 mats, which was a previous record, when most swords can only cut 8 mats.

4. I have over 20 years of sword making experience including being a lecturer for the American Blade at the International Blade show and for the American Bladesmith Society. I have also consulted with Lockheed Martin concerning metallurgy during the development of their Joint

Strike Fighter Jet. Additionally my metallurgy processes have been used on drill bits, and other carbide based drilling equipment used in the drilling for oil or water.

5. I further attest as follows:

6. All of the individual particles that make up the carbide material are placed into their most stable state. These particles then are aligned optimally with surrounding particles. Also, molecular bonds are strengthened by the process.

7. The extreme cold temperatures during cryogenic processing also slow movement at the atomic level, increasing internal molecular bonding energy and promoting a pure structural balance throughout the material. The end result is a material with an extremely uniform, refined and dense microstructure with vastly improved properties.

8. The following is data from testing performed at our facility using the same starting material for each test. The test items were HT/HP tungsten carbide end mills, 3/16" diameter and 1 3/4 " overall. These were subjected to different cryogenic cold temperature and different heating temperatures. Each sample essentially was a carbide material treated according the Cerutti method, as the starting material. Then each sample was first cooled to the first indicated temperature, then heated to the heating temperature then cooled to the second indicated temperature, then heated to the heating temperature then cooled a third time to the third indicated temperature then allowed to warm up. Upon completion of the treating process, the carbide material was tested via number of holes drilled in hardened S7 tool steel, until failure. Uniform spindle speed and feed rate were used in all tests.

Percent Increase in Wear Resistance After Cryogenic Processing					
Sample Number	Cryo. Temp Used	Heating Temp	# of Holes Drilled	Total #	Difference Between Highest # of Holes Dilled and Lowest
1	-120/-120/-120	Zero F	17, 12, 2	31	15
2	-120/-120/-120	+700	15, 18, 29	62	14
3	-120/-120/-120	+1400	22, 24, 27	73	5

4	-380/-380/-380	0	9,34, 12	55	25
5	-380/-380/-380	+700	31, 23, 26	90	8
6	-380/-380/-380	+1400	28, 24, 25	77	4
7	-280/-220/-180	0	18, 7, 21	46	14
8	-280/-220/-180	+700	27, 32, 29	88	5
9	-280/-220/-180	+1400	27, 18, 33	78	15
10	Cerutti material		3, 11, 6	20	8

9. In addition to the above test results I hereby attest that if the cooling hold at the cryogenic temperature is for less than 2 hours, the carbide breaks due to inadequate penetration and stress cracking that occurs in the metal. If the heating hold time occurs for les than 15 minutes, the carbide shatters having acquired different stress from thermal variations across the material.

10. Additionally, using less than 2 hours of hold time at the cryogenic levels shows lower performance characteristics due to uneven penetration during the shorter time period causing additional stress and lowered performance. I attest I have tested between 800 and 1500 components of machining tools made of carbide over a period of time between 2003 and 2006 and observed these results.

11. Using a shorter hold time of 15 minutes for the elevated temperatures, I have observed uneven tempering which results in softening and a ductile surface with a more brittle core, which is the opposite of the desired effect from the process of the invention In fact, the item tends to shatter, due to thermal variations that occur across the material in this shorter time period.

12. Too rapid a rate of a temperature change results in thermal shock and microcracking in the material surface. A benefit in the current rate of temperature change has been shown through experimentation, to be near 0.25 to 20 degrees per minute. Larger items require slower times

while smaller items may be cooled more rapidly. Factor is a size rather than material, in order to allow internal equilibration of temperature.

13. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and forth that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

DANIEL WATSON